Spring Run Chinook Salmon

Draft Preliminary Example Biological Goals, Objectives, and Stressors Logic Chain for the BDCP

February 27th, 2012

Global Goals

Removal of the Central Valley spring-run Chinook salmon ESU from the Federal List of Endangered and Threatened Wildlife (NMFS 2009). According to the NMFS draft recovery plan (2009), recovery and long-term sustainability requires:

1) Adequate protection for replacement of losses due to natural mortality (disease and stochastic events)
2) Sufficient genetic robustness to avoid inbreeding depression and allow for adaptation
3) Sufficient habitat (type, amount, and quality) for long-term population maintenance, and
4) Elimination or control of threats.

Global Objectives

There are two components of Global Objectives that are relevant to the BDCP program. The first pertains to Recovery Plan goals based on Viable Salmonid Population (VSP) criteria, and further refined for the Central Valley in Lindley et al. (2007). The second component relates to Critical Habitat (as designated for Central Valley spring-run Chinook salmon 70 FR 52488 on September 2, 2005).

Global VSP Objectives include:

VSP1. Increase abundance

VSP2. Increase spatial distribution

- a. Secure all extant populations (all populations are important because there are so many "missing" populations in the Central Valley)
- b. Recover populations in each diversity group

VSP3. Protect and increase life history and genetic diversity

VSP4. Increase productivity (population growth rate = births-deaths)

Viable populations should demonstrate a combination of population growth rate and abundance that produces an acceptable probability of population persistence (NMFS Draft Recovery Plan).

Global Critical Habitat Objectives (from primary constituent elements)

CH1. Provide Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development

CH2. Provide freshwater rearing sites with:

(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
(ii) Water quality and forage supporting juvenile development; and
(iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

CH3. Provide freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

CH4. Provide estuarine areas free of obstruction and excessive predation with:

(i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;
(ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and
(iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

SPRING RUN – GLOBAL **ABUNDANCE** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Increase spring-run Chinook salmon abundance	Achievement of 6-year geometric mean escapement levels of: 59,000 naturally produced adults in the Sacramento River and its tributaries[1], with no year below 30,000; and a five year annual average escapement of 30,000 naturally produced adults in the San Joaquin River and its tributaries[2], with no year below 10,000. [These numbers do not include hatchery produced fish]. [1]From AFRP doubling goals [2]From SJ River Restoration Program	Improved juvenile survival (as a proxy for abundance) within the Plan Area, SF Bay, and the nearshore ocean.	Increase current survival rate of juvenile emigrants from Sac and SJ River systems through Delta, SF Bay, and into nearshore ocean[3].	Entrainment	Reduce entrainment of spring-run by at least 50% in all water year types	-Water Ops -Alternate migration routes
				Predation	-Decrease mortality from predation in (specify locations & months) by __%. -Increase quantity and quality of rearing habitat (including floodplain, channel margin, and riparian habitats) throughout the Delta	-Predator removal -Water Ops
				Limited Rearing Habitat	Increase average size of juveniles (relative to current conditions) as they migrate through the Delta to __% of their physiological maximum (corrected for temp)	-Yolo bypass -SJR bypass -Suisun -Ammonia
				North Delta Diversion Facilities	Maintain survival rates through the reach containing new north Delta diversions to no more than a 2% loss per screen, and no more than a 5% cumulative loss.	-Water Ops -Alternate migration routes -Predator removal
				Limited Migration Flows	Maintain minimum Delta inflows in key migratory months	-Water Ops
		Increase migration/ spawning success of adult spring-run migrating through the Delta.	Eliminate human-induced passage delays or illegal take of spring-run adults in the Delta.	Migration barriers	Eliminate known human-caused passage impediments (chemical and physical) in the Plan Area	-Fremont weir -SDWSC
				Poaching	Eliminate spring-run poaching in the Delta	-Funding for game wardens

[3]The exact survival rate is TBD, but would be high enough to allow for positive population growth rates.

SPRING RUN – GLOBAL **SPATIAL DISTRIBUTION** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Increase spatial distribution of spring-run Chinook salmon	Restoration of six self-sustaining, independent populations of wild spring-run in watersheds of the Sacramento R. drainage, including viable pop's in: a. Northwestern CA Region (Clear Crk to Stony Crk); b. Basalt & Porous Lava Region (L. Sac R.-Battle Crk); c. Northern Sierra Region (Antelope Crk to Mokelumne R.), **and** Two self-sustaining, independent pop's in watersheds of the SJ River drainage; e. maintenance of Core 2 pops at mod. risk of extinction	Improved adult and juvenile migration success through the Delta to and from the SJ River and Sac. River Basins (as a proxy for spatial distribution)	Eliminate human-induced adult passage delays (barriers that necessitate median passage time > 36 hrs.)	Migration barriers –Sac. River	Eliminate known human-caused passage physical impediments (physical) within Plan Area	-Fremont weir
				Migration barriers – SJ River	Eliminate known human-caused passage impediments (chemical) w/i Plan Area	-SDWSC
				Attraction flows	Provide Delta inflows > __cfs (Sac River) and >___cfs (SJ River), between __date__ & __date__.	-Water Ops
			Create one juvenile migration pathway in the SJ River (Friant Dam to Delta) in all years, and create a second pathway on the SJ River ---------- Create one alternate migratory path on the lower Sac. River in > 40% of years.	Entrainment	Maintain SJ River spring-run entrainment at project pumps to < 2% of estimated smolt production in all water year types.	-Water Ops -SJR flood bypass
				Limited juvenile emigration routes (SJ River)	Provide juvenile migration flows scaled to unimpaired hydrology (see Table __) on lower SJ River & eliminate low DO barrier between [date]&[date].	-Water Ops -SDWSC
				Limited juvenile emigration routes (SJ River)	Ensure that at least __ % of juvenile SJR spring-run emigrate through a non-mainstem channel route (flood bypass) in at least 30% of years.	-SJ River flood bypass
				Limited juvenile emigration routes (Sac. River)	Ensure that at least __ % of juvenile Sacramento spring-run emigrate through a non-mainstem channel route (e.g. flood bypass) in at least 40% of years.	-Yolo bypass -Fremont weir

SPRING RUN – GLOBAL **LIFE HISTORY AND GENETIC DIVERSITY** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Conserve and restore life-history and genetic diversity of spring-run Chinook salmon	Protect and restore the full range of adult and juvenile life-history types migrating through the Delta .	Ensure that the project does not favor the survival of one life-history type over others.	Eliminate artificial selection for spring-run life-history types resulting from project operations (including hatcheries).	Hatchery Effects	Adopt hatchery practices that minimize adverse changes to life-history traits (e.g., size/age at smolting, age at maturity, migration timing) of wild spring-run Chinook.	-Hatchery reform
				Hatchery Effects	Alter hatchery practices to minimize adverse changes in life-history traits of hatchery spring-run Chinook.	-Hatchery reform
				Entrainment	Ensure that entrainment does not favor the survival of one life-history type over other types (e.g., early or late migrating smolts or adults)	-Water Ops
				Flow Magnitude and Timing	To an equal degree across spring-run life-history types (e.g., size/age at smolting, age at maturity, migration timing) provide flows that support rearing and migration in all times and places where they occur.	-Water Ops (including upstream) -SJ River
				Rearing Habitat	Spring-run Chinook in both Sacramento and San Joaquin Rivers will have access to inundated floodplains > 45 days in at least 1 of 3 years,	-Yolo Bypass -SJ River floodplain